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10/665,091	09/16/2003	Shuichi Kojima	16869G-086600US	6188

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EXAMINER

RENNER, CRAIG A

ART UNIT	PAPER NUMBER
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2652

DATE MAILED: 12/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/665,091

Applicant(s)

KOJIMA ET AL.

Examiner

Craig A. Renner

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>16 September 2003</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of "Group I (claims 1-20)" and cancellation of non-elected "Claims 21 and 22 ... without prejudice or disclaimer" in the reply filed on 22 September 2005 is acknowledged.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

3. The drawings are objected to because of the following informalities:

a. FIS. 3 and 4(c) should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).

b. In FIG. 13, each instance of "Nita" should be corrected to read --NiTa--.

Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective

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action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “structure in which a lower surface of said free layer is flush with a lower surface of said magnetic domain control film” set forth in claims 6 and 16 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) and/or an amendment to the claims in compliance with 37 CFR 1.121(c) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the

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applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

5. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
6. The disclosure is objected to because of the following informalities:
 - a. In line 3 on page 27, "grass" should be corrected to read --glass--.
 - b. In line 2 of claim 7, "comprise" should be corrected to read --comprises--.
 - c. In line 9 of claim 11, --a-- should be inserted before "range" for better clarity.
 - d. In line 14 of claim 11, --a-- should be inserted before "crystallization state" for better clarity.
 - e. In line 2 of claim 17, "comprise" should be corrected to read --comprises--.

Appropriate correction is required.

7. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. In lines 13 and 14 of claim 1, line 2 of claim 2, line 2 of claim 3, line 2 of claim 4, line 3 of claim 5, line 2 of claim 7, lines 2-3 and 5 of claim 8, and lines 2-3 of claim 9, it is indefinite as to whether each instance of "said underlayer" refers to that set forth in line 4 of independent claim 1, or that set forth in line 12 of independent claim 1.

b. Many elements in the claims are indefinite because they lack clear and/or positive antecedent basis including "said upper non-magnetic layer" (lines 3-4 of claim 3, line 3 of claim 4, lines 3-4 of claim 13, and line 3 of claim 14), "said upper pinned layer" (line 4 of claim 3, line 3 of claim 4, line 4 of claim 13, and line 3 of claim 14), and "said upper anti-ferromagnetic layer" (line 4 of claim 3, lines 3-4 of claim 4, line 4 of claim 13, and lines 3-4 of claim 14).

c. In lines 13 and 14 of claim 11, line 2 of claim 12, line 2 of claim 13, line 2 of claim 14, line 3 of claim 15, line 2 of claim 17, lines 2-3 and 5 of claim 18, and lines 2-3 of claim 19, it is indefinite as to whether each instance of "said underlayer" refers to

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that set forth in line 4 of independent claim 11, or that set forth in line 12 of independent claim 11.

d. Claims 6, 10, 16, and 20 inherit the indefiniteness associated with their respective base claims and stand rejected as well.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claims 1-2, 5, 7-8, 10-12, 15, 17-18, and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Lin et al. (US 6,876,525).

Lin teaches a magnetoresistive sensor comprising a stack of magnetoresistive layers including an anti-ferromagnetic layer (54), a pinned layer (58), a non-magnetic layer (62), and a free layer (66); an underlayer (50) of the stack of magnetoresistive layers; a magnetic domain control film (332); and a pair of electrode films (each 344) for supplying current to the stack of magnetoresistive layers; wherein a center position (352) of an upper surface and a lower surface of the magnetic domain control film is

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positioned within a range (includes 124) of an upper surface and a lower surface of the free layer (as shown in Fig. 9, for instance); and further comprising an underlayer (328) formed below the magnetic domain control film; and an amorphous metal film layer (324) formed below the underlayer for controlling crystallization of the underlayer [as per claim 1]; wherein a center position (124) of an upper surface and a lower surface of the free layer is positioned within a range (includes 352) of an upper surface and a lower surface at a position near an end of the magnetic domain control film (as shown in Fig. 9, for instance) [as per claim 11]; wherein the stack of magnetoresistive layers comprises the underlayer, the anti-ferromagnetic layer, the pinned layer, the non-magnetic layer, the free layer and a protection layer (70) formed in this order from the lower layer to the upper layer (as shown in Fig. 2, for instance) [as per claims 2 and 12]; wherein the amorphous metal film layer is formed on any one of surfaces within a range from a lower surface of the underlayer to an upper surface of the non-magnetic layer of the stack of magnetoresistive layers (as shown in Fig. 9, for instance) [as per claims 5 and 15]; wherein the underlayer is formed of Cr or Cr alloy (lines 45-47 in column 10, for instance, i.e., "W-Cr") and comprises a body-centered cubic lattice (BCC) polycrystal thin film (lines 53-54 in column 1, for instance), and polycrystal orientation to formed plane is isometric random crystal orientation having no particular crystal orientation (lines 61-63 in column 1, for instance) [as per claims 7 and 17]; wherein the magnetic domain control film is formed of a Co alloy film (line 19 in column 9, for instance), the underlayer disposed below the magnetic control film controls a crystallization state of the magnetic domain control film (lines 64-67 in column 1, for instance), and the

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amorphous metal film layer controls a crystallization state of the underlayer (lines 60-63 in column 1, for instance) [as per claims 8 and 18]; and wherein the magnetoresistive sensor is a component of a magnetoresistive head (300, for instance) [as per claims 10 and 20].

12. Claims 1-2, 5-6, 8-12, 15-16, and 18-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Ooshima (US 6,888,706).

Ooshima teaches a magnetoresistive sensor comprising a stack of magnetoresistive layers including an anti-ferromagnetic layer (26), a pinned layer (27), a non-magnetic layer (28), and a free layer (29); an underlayer (22) of the stack of magnetoresistive layers; a magnetic domain control film (34); and a pair of electrode films (each 36) for supplying current to the stack of magnetoresistive layers; wherein a center position (corresponding to D) of an upper surface (34b left-most side in FIG. 3, for instance) and a lower surface (34a) of the magnetic domain control film is positioned within a range of an upper surface (29b) and a lower surface (29a) of the free layer (as shown in FIG. 3, for instance, i.e. positioned at the lower surface of the free layer); and further comprising an underlayer (33) formed below the magnetic domain control film; and an amorphous metal film layer (32) formed below the underlayer for controlling crystallization of the underlayer [as per claim 1]; wherein a center position of an upper surface (29b) and a lower surface (29a) of the free layer is positioned within a range (from D to E) of an upper surface (34b) and a lower surface (34a) at a position near an end of the magnetic domain control film (as shown in FIG. 3, for instance) [as per claim

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11]; wherein the stack of magnetoresistive layers comprises the underlayer, the anti-ferromagnetic layer, the pinned layer, the non-magnetic layer, the free layer and a protection layer (30) formed in this order from the lower layer to the upper layer (as shown in FIG. 3, for instance) [as per claims 2 and 12]; wherein the amorphous metal film layer is formed on any one of surfaces within a range from a lower surface of the underlayer to an upper surface of the non-magnetic layer of the stack of magnetoresistive layers (as shown in FIG. 3, for instance, i.e., a lower surface of the underlayer) [as per claims 5 and 15]; wherein the magnetoresistive sensor has a structure in which a lower surface of the free layer is flush with a lower surface of the magnetic domain control film (as shown in FIG. 6, for instance), and a bias magnetic field of the magnetic domain control film is mainly applied to the free layer (lines 3-6 in column 13, for instance) [as per claims 6 and 16]; wherein the magnetic domain control film is formed of a Co alloy film (line 15 in column 13, for instance), the underlayer disposed below the magnetic control film controls a crystallization state of the magnetic domain control film (lines 56-65 in column 16, for instance), and the amorphous metal film layer controls a crystallization state of the underlayer (lines 49-62 in column 11, for instance) [as per claims 8 and 18]; wherein the magnetic domain control film is formed of a Co alloy film (line 15 in column 13, for instance), the underlayer is formed of a Cr or Cr alloy film (lines 41-42 in column 16, for instance, i.e., "Cr"), and the amorphous metal film layer is formed of an Ni series alloy or Co series alloy film (lines 28-30 in column 16, for instance, i.e., "Co" series alloy) [as per claims 9 and 19]; and wherein the

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magnetoresistive sensor is a component of a magnetoresistive head (as shown in FIGS. 1-3 and 6, for instance) [as per claims 10 and 20].

13. Claims 1-5, 8, 10-15, 18, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Aoki et al. (JP 2002-151755).

Aoki teaches a magnetoresistive sensor comprising a stack of magnetoresistive layers including an anti-ferromagnetic layer (26), a pinned layer (27), a non-magnetic layer (28), and a free layer (29); an underlayer (25) of the stack of magnetoresistive layers; a magnetic domain control film (34); and a pair of electrode films (each 36) for supplying current to the stack of magnetoresistive layers; wherein a center position of an upper surface and a lower surface of the magnetic domain control film is positioned within a range of an upper surface and a lower surface of the free layer (as shown in FIG. 8, for instance); and further comprising an underlayer (33) formed below the magnetic domain control film; and an amorphous metal film layer (32) formed below the underlayer for controlling crystallization of the underlayer [as per claim 1]; wherein a center position of an upper surface and a lower surface of the free layer is positioned within a range of an upper surface and a lower surface at a position near an end of the magnetic domain control film (as shown in FIG. 8, for instance) [as per claim 11]; wherein the stack of magnetoresistive layers comprises the underlayer, the anti-ferromagnetic layer, the pinned layer, the non-magnetic layer, the free layer and a protection layer (30) formed in this order from the lower layer to the upper layer (as shown in FIG. 8, for instance) [as per claims 2 and 12]; wherein the stack of

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magnetoresistive layers comprises the underlayer, the anti-ferromagnetic layer, the pinned layer, the non-magnetic layer, the free layer, an upper non-magnetic layer (52), an upper pinned layer (53), an upper anti-ferromagnetic layer (54) and a protection layer (30) formed in this order from the lower layer to the upper layer (as shown in FIG. 8, for instance) [as per claims 3-4 and 13-14]; wherein the amorphous metal film layer is formed on any one of surfaces within a range from a lower surface of the underlayer to an upper surface of the non-magnetic layer of the stack of magnetoresistive layers (as shown in FIG. 8, for instance) [as per claims 5 and 15]; wherein the magnetic domain control film is formed of a Co alloy film (paragraph [0110], for instance), the underlayer disposed below the magnetic control film controls a crystallization state of the magnetic domain control film, and the amorphous metal film layer controls a crystallization state of the underlayer (as shown in FIG. 8, for instance) [as per claims 8 and 18]; and wherein the magnetoresistive sensor is a component of a magnetoresistive head (as shown in FIG. 8, for instance) [as per claims 10 and 20].

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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15. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

16. Claims 3-4 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ooshima (US 6,888,706).

Ooshima teaches the magnetoresistive sensor as detailed in paragraph 12, supra. Ooshima, however, remains silent as to the stack of magnetoresistive layers further comprising an "upper non-magnetic layer," an "upper pinned layer," and an "upper anti-ferromagnetic layer" as per claims 3-4 and 13-14.

Official notice is taken of the fact that it is notoriously old and well known in the art to have a stack of magnetoresistive layers further comprising an upper non-magnetic layer, an upper pinned layer, and an upper anti-ferromagnetic layer in the same field of endeavor for the purpose of increasing sensitivity by forming a dual spin valve magnetoresistive sensor. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have had the stack of magnetoresistive layers of Ooshima further comprise an upper non-magnetic layer, an upper pinned layer, and an upper anti-ferromagnetic layer. The rationale is as follows:

One of ordinary skill in the art would have been motivated to have had the stack of magnetoresistive layers of Ooshima further comprise an upper non-magnetic layer,

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an upper pinned layer, and an upper anti-ferromagnetic layer since such increases sensitivity by forming a dual spin valve magnetoresistive sensor.

Pertinent Prior Art

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. This includes Hasegawa (US 2002/0051328), which teaches a dual spin valve magnetoresistive sensor (FIG. 35, for instance) with a free layer (107) center substantially aligned with a magnetic domain control film (132) center.

Conclusion

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig A. Renner whose telephone number is (571) 272-7580. The examiner can normally be reached on Tuesday-Friday 9:00 AM - 7:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, A. L. Wellington can be reached on (571) 272-4483. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Craig A. Renner
Primary Examiner
Art Unit 2652

CAR